

MONTHLY WEATHER REVIEW.

Editor: Prof. CLEVELAND ABBE. Assistant Editor: FRANK OWEN STETSON.

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INTRODUCTION.

The MONTHLY WEATHER REVIEW for November, 1904, is based on data from about 3300 stations, classified as follows:

Weather Bureau stations, regular, telegraph, and mail, 167; West Indian Service, cable and mail, 4; River and Flood Service, regular 43, special river and rainfall, 190, special rainfall only, 56; voluntary observers, domestic and foreign, 2565; total Weather Bureau Service, 3025; Canadian Meteorological Service, by telegraph and mail, 20, by mail only, 13; Meteorological Service of the Azores, by cable, 2; Meteorological Office, London, by cable, 8; Mexican Telegraph Company, by cable, 3; Army Post Hospital reports, 18; United States Life-Saving Service, 9; Southern Pacific Company, 96; Hawaiian Meteorological Service, 75; Jamaica Weather Service, 130; Costa Rican Meteorological Service, 25; The New Panama Canal Company, 5; Central Meteorological Observatory of Mexico, 20 station summaries, also printed daily bulletins and charts, based on simultaneous observations at about 40 stations; Mexican Federal Telegraph Service, printed daily charts, based on about 30 stations.

Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada; Mr. R. C. Lydecker, Territorial Meteorologist, Honolulu, Hawaii; Señor Manuel E. Pastrana, Director of the Central Meteorological and Magnetic Observatory of Mexico; Camilo A. Gonzales, Director-General of Mexican Telegraphs; Capt. S. I. Kimball, Superintendent of the United States Life-Saving Service; Lieut. Commander H. M. Hodges, Hydrographer, United States Navy; H. Pit-

tier, Director of the Physico-Geographic Institute, San José, Costa Rica; Commandant Francisco S. Chaves, Director of the Meteorological Service of the Azores, Ponta Delgada, St. Michaels, Azores; W. N. Shaw, Esq., Secretary, Meteorological Office, London; Rev. José Algué, S. J., Director, Philippine Weather Service; and H. H. Cousins, Chemist, in charge of the Jamaica Weather Office; Señor Enrique A. Del Monte, Director of the Meteorological Service of the Republic of Cuba.

Attention is called to the fact that the clocks and self-registers at regular Weather Bureau stations are all set to seventy-fifth meridian or eastern standard time, which is exactly five hours behind Greenwich time; as far as practicable, only this standard of time is used in the text of the REVIEW, since all Weather Bureau observations are required to be taken and recorded by it. The standards used by the public in the United States and Canada and by the voluntary observers are believed to conform generally to the modern international system of standard meridians, one hour apart, beginning with Greenwich. The Hawaiian standard meridian is $157^{\circ} 30'$, or $10^{\text{h}} 30^{\text{m}}$ west of Greenwich. The Costa Rican standard meridian is that of San José, $5^{\text{h}} 36^{\text{m}}$ west of Greenwich. Records of miscellaneous phenomena that are reported occasionally in other standards of time by voluntary observers or newspaper correspondents are sometimes corrected to agree with the eastern standard; otherwise, the local standard is mentioned.

Barometric pressures, whether "station pressures" or "sea-level pressures," are now reduced to standard gravity, so that they express pressure in a standard system of absolute measures.

FORECASTS AND WARNINGS.

By Prof. E. B. GARRIOTT, in charge of Forecast Division.

During November barometric pressure was generally low over the western North Atlantic, a succession of low areas following each other very closely. On the 1st and 2d, 16th and 17th, and 28th and 29th, however, areas of high pressure extended from the Atlantic coast of the United States over Bermuda. Over the Azores, the pressure was generally high throughout the month, but relatively low from the 1st to the 3d, from the 11th to the 14th, and from the 25th to the 27th. The only well marked storm of the month in the vicinity of the Azores occurred on the 12th, when at Horta a barometer reading of 29.60 inches and a maximum wind velocity of 52 miles an hour from the south were recorded. Over southwestern Europe, pressure was low on the 9th, 18th, from the 23d to the 24th, and from the 27th to the 30th, and generally high the remainder of the month. Over the British Isles high pressure prevailed from the 12th to the 18th. Before the 12th and after the 18th pressure was generally low, as a succession of storm areas attended by fresh gales passed over Ireland and Scotland, affecting England in their passage to a greater or less degree. The storm that reached the coast of Scotland on the 19th can probably be identified with the one of marked intensity that was central over Nova Scotia on the 14th, and crossed the Atlantic in high latitudes. This storm caused high winds and heavy snows quite generally over the British Isles on the 21st and 22d, and finally moved eastward to the continent of Europe.

In the United States, the barometric disturbances, with one

or two exceptions, showed no remarkable features. During the first decade of the month the pressure was rather low over the Caribbean Sea, and on the 9th a shallow depression, apparently central south of the Isle of Pines, caused rain in southern Florida. This disturbance moved slowly northward, gradually increasing in intensity, and causing rain over the Florida Peninsula. During the night of the 12-13th its center had moved from Jacksonville to Hatteras, and fallen in pressure from 29.60 inches to 29.08. Rain occurred generally over the Southern and Middle Atlantic States, and high winds were reported along the coast. At noon, November 13, the center was east of Norfolk, with pressure below 29.00 inches. At 8 p. m. of the 13th, the center was near New York, N. Y., with a barometer reading of 28.74 inches at that point. Heavy precipitation occurred in the Middle Atlantic States and New England, and in many places this precipitation was in the form of snow, even as far south as North Carolina. High winds and gales were reported from all coast stations from Jacksonville to Eastport, a wind of 78 miles per hour being registered at Block Island. At 8 a. m. of the 14th the center of disturbance was over Nova Scotia, with a pressure of 28.60 inches and heavy rain and snow had continued over New England. By the evening of the 14th, the storm had passed off to sea, pursuing an east-northeasterly course, and apparently reaching the coast of Scotland on the 19th, somewhat diminished in intensity.

During the passage of this storm up the Atlantic coast,

much damage was done to shipping, and several lives were lost. The Life-Saving station at New Inlet was swept away by the heavy seas, and four of the men stationed there were drowned. The schooner *Missouri* was wrecked off Washington, N. C., and four lives lost. The barkentine *Elmiranda* was wrecked off the Florida coast and her mate drowned, captain and crew being rescued. The schooner *Arcularious* was blown on the rocks of the Massachusetts coast near Tarpaulin Cove, and her crew of four men lost. Communication by telegraph and telephone was interrupted in New England and the Middle Atlantic States, wires and poles were blown down, and the coast towns suffered considerable other damage.

Storm warnings were issued well in advance of the storm as it moved up the coast, and hurricane warnings were issued for the New England coast where it attained its maximum intensity. Undoubtedly much property and many lives were saved by the attention paid to these warnings.

While several moderate disturbances crossed the Lake region during the month, there was only one of marked intensity. While the storm just referred to was moving up the Atlantic coast, another was crossing the lower Lakes, and the two eventually united in the vicinity of New York, N. Y., on the 13th. This Lake storm caused considerable damage to shipping and property along the Lake shore. The tug *Gregory* was overturned by the gale off Buffalo, on the 13th, and the captain was drowned. That the loss of life and property was not greater and more widespread is explained by the Buffalo Enquirer of November 14.

Fortunately the Weather Bureau had sent out a storm warning early in the day, and this kept many boats from venturing out on the storm-tossed waves.

A number of storms appeared off the north Pacific coast during the month, and the high winds and gales which accompanied them did considerable damage to shipping. Timely warning was given of their approach, however. The following is from the Oregonian of Portland, Oreg., under the date of November 19:

The accuracy of the forecasts of the Weather Bureau on last week's storms was remarkable, and shipmasters who heeded the storm warnings and remained snug in port saved money for the underwriters and much unpleasantness for themselves. Considering the violence of the gales which raged for the greater part of the week, the Weather Bureau was quite fortunate in maintaining communication with the North Head station. The service from that point is of great value to the shipping community, and Mr. Beals, who has been untiring in his efforts to make it as prompt and accurate as possible is to be congratulated on his success.

The October drought in the Gulf States was broken in the first days of the month by the rains attending an area of low pressure which moved along the Gulf coast, and eventually up the Atlantic. Generous rains attended this storm along the Atlantic coast, and heavy rains accompanied the storm of the 11-13th. In the interior of the country, the month was unusually dry except in the Lake region, where moderate rains attended the passage of several low areas.

Killing frost and freezing temperature occurred in north-eastern Texas on the morning of the 11th, extending as far south as San Antonio on the 12th, and eastward over Arkansas and northern Louisiana and Mississippi on the 13th. Light frost occurred as far south as Jacksonville and Mobile on the morning of the 15th. Ample warnings had been issued for all places affected. No well marked cold wave occurred during the month, and temperatures were generally moderate throughout the country.

NEW ENGLAND FORECAST DISTRICT.

The weather during November was more pleasant than usual for this month, with a general and marked deficiency in the precipitation, and temperature much below the normal. The month was one of the coldest of its name, and the drought in some sections almost amounted to a water famine. The only storm of consequence occurred on the 13-14th, and it reached

all sections of New England, causing heavy snow in northern and interior and moderate to heavy precipitation, mostly rain, in other portions of the district. The disturbance was also accompanied by high winds and gales, which attained hurricane force at some points on the coast. No great damage resulted at Boston and its immediate vicinity, but at most interior points the snow and sleet, with the high winds, caused great damage and loss to the electric light service, telegraph, telephone, and cars, breaking down poles and wrecking wires. The destruction in this direction was probably the greatest and most widespread since the memorable storm of November 26-27, 1898. There was some loss of life and considerable loss and damage to shipping along the coast. The Weather Bureau gave pronounced and timely warnings of the storm's approach, and the information was of incalculable benefit, and doubtless resulted in the saving of many lives and a number of vessels. The local papers, in commenting on the storm, remarked as follows:

Boston Globe:

The storm had been predicted by the weather forecaster, and many who would suffer most from being exposed to its fury accepted the prediction warning and clung to places where they were least exposed to the storm.

The Boston Transcript:

Ample warning was given by the Weather Bureau, Saturday, of the approach of the storm, at a time when the skies were clear and a north-easter little expected; and to the warning is doubtless due the comparatively few number of wrecks and disasters.

J. W. Smith, District Forecaster.

NORTH-CENTRAL FORECAST DISTRICT.

No very severe storms passed over the upper Lake region during the month, although warnings were ordered in advance of five storms of moderate intensity, on the 9th, 12th, 19th, 23d, 28th, and 29th. The warnings on the two last named dates were for one storm, southeast warnings being ordered on the 28th, which were changed to northwest on the 29th.

The weather continued comparatively dry throughout the entire district, very little rain or snow falling. The temperature was considerably above the normal for the month, and no marked cold waves at any time passed over the district.—*H. J. Cox, Professor and District Forecaster.*

WEST GULF FORECAST DISTRICT.

The first extensive freeze of the season in the west Gulf district made its appearance over the northwestern portion of the district on the 11th, and extended southward during the 12th and 13th, and caused freezing or frost to the coast line. The temperature fell to 28° over black lands in the northern part of the sugar region and damaged cane slightly in a few localities, but the low temperature was of short duration and was generally beneficial to the crop. Frost or freezing temperature warnings were issued daily for some portions of the district from the 10th to the 12th. This enabled planters to save seed cane in good condition and to protect tender vegetation. No injurious frosts or low temperatures occurred without warning. No general storm occurred along the coast during the month.—*I. M. Cline, District Forecaster.*

ROCKY MOUNTAIN FORECAST DISTRICT.

No special warnings were issued or needed. The month was exceptionally dry throughout the district; bright skies were a feature, and temperatures were generally above normal.—*F. H. Brandenburg, District Forecaster.*

NORTH PACIFIC FORECAST DISTRICT.

The stormy season in this district began shortly before the middle of the month and lasted until near its close, during which time a succession of November gales of unusual severity occurred. Timely warnings were issued in all cases, and the casualties to shipping were small and confined wholly to vessels that had left port several days before the storms began,

and thereby were caught in the open seas and unable to obtain shelter in a safe harbor.

The disturbances were attended by generous rains west of the Cascade Mountains, notwithstanding which fact most of the rivers in that section were but little affected and maintained lower stages than usual under such conditions. The storms, after making their appearance off the Washington coast, in nearly every instance moved northeasterly over British Columbia, and on this account the rainfall in the inter-mountain section of the North Pacific district, was much less than usual.

The temperatures were uniformly mild, and in the principal agricultural sections of western Oregon and western Washington, no killing frosts have yet occurred.—*E. A. Beals, District Forecaster.*

SOUTH PACIFIC FORECAST DISTRICT.

The month opened with a moderate disturbance over the north Pacific coast accompanied with high southeasterly wind and rain as far south as San Francisco. The disturbance moved eastward along the international boundary. A succession of disturbances passed northward during the month, most of them too far north to influence conditions south of San Francisco. The month, as a whole, showed a deficient rainfall in the southern and central portions of the State. In the vicinity of San Francisco less than half the normal amount of rain fell, and in California, south of the Tehachapi, no rain fell during the month. The absence of rain at this time materially affects crop conditions. A heavy "norther" was re-

ported in the valleys of the southern portion of the State on November 11. A marked disturbance occurred on November 15 and thunderstorms were reported in the northern portions of the State. The month was singularly free from frosts.—*Alexander G. McAdie, Professor and District Forecaster.*

RIVERS AND FLOODS.

River conditions during November did not differ materially from those of the preceding month. The Mississippi River and its tributaries showed but slight change; in the northern portion there was a slow and steady fall throughout the month; in the southern portion there was a slight rise during the first half and a slow fall during the last half of the month.

The rivers of the Atlantic slope were highest during the middle of the month and with the exception of the Cape Fear, Pedee, and Wateree rivers showed but slight changes.

On November 1, 1904, a new river gage was put in service at Riverton, Ala.; the zero of the new gage is 1.2 feet lower than that of the gage used previous to November 1.

The highest and lowest water, mean stage, and monthly range at 251 river stations are given in Table VII. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—*E. B. Garriott, Professor.*

CLIMATE AND CROP SERVICE.

By Mr. JAMES BERRY, Chief of Climate and Crop Division.

The following summaries relating to the general weather and crop conditions during November are furnished by the directors of the respective sections of the Climate and Crop Service of the Weather Bureau; they are based upon voluntary reports from meteorological observers and crop correspondents, of whom there are about 3300 and 14,000, respectively:

Alabama.—Weather favorable for gathering late crops. Long drought broken early in month. Beneficial rains early and latter parts of last decade, but precipitation generally slightly deficient. Several light freezes. Comparatively little plowing done. Some wheat and oats up to good stands by close of month; small acreage in oats, considerably more to be sown during winter. Cotton practically all picked by 15th, yield slightly above average. Corn all housed, yield good. Minor crops fairly good.—*F. P. Chaffee.*

Arizona.—Dry weather prevailed generally during November. Temperature averaged slightly below normal. Frost did little damage in central and southern counties, but suspended all growth in northern counties. Planting was in progress, except in the northern section of the Territory, where the ground was too dry for plowing. Dry feed was plentiful on ranges; stock was in good condition for the approaching winter, and farming conditions were generally favorable.—*H. K. Holcomb.*

Arkansas.—Temperature was about normal, rainfall deficient. Month favorable for gathering outstanding crops, but too dry for fall plowing. Cotton picking and corn gathering carried on without interruption, and by close of month only small per cent remained in field. Less than usual acreage sown to fall grains, but where sown they did fairly well. Stock not doing well, owing to scarcity of water and to lack of good pasturage.—*O. C. Burrows.*

California.—Weather conditions were about normal, except in southern California, where abnormally high temperatures occurred, accompanied by drying winds. The rainfall in the central and northern sections was abundant for the season, and much progress was made in plowing and seeding. The drought seriously retarded farming operations in the southern sections. Early sown wheat made good growth. The grain acreage promised to be larger than usual, except in the south. Orange picking and shipping commenced on the 1st.—*Alexander G. McAdie.*

Colorado.—The month was favorable for the securing of crops, but was too dry for fall plowing. Grass was reported good, except in the Arkansas Valley, the south-central counties, and on the Divide, where it was reported fair. Stock water was generally sufficient, and at the end of the month cattle, horses, and sheep were in good condition.—*F. H. Brandenburg.*

Florida.—The month averaged cooler and wetter than the normal. Farm work was advanced. The last of the cotton crop was picked and minor crops harvested. The shipment of citrus fruits continued active,

a large portion of the crop having been marketed. The condition of vegetables was improved, except in small areas where precipitation was deficient. Frost formed over all districts except the southern, and freezing temperatures occurred over portions of the western and northern districts; no damage.—*A. J. Mitchell.*

Georgia.—Unusually favorable weather for farming operations prevailed. Harvesting practically completed; yields generally good. Cotton above average, quality exceptionally fine. Moisture sufficient for fall plowing; seeding progressing rapidly, seed germinating and growing nicely. Increased acreage sown to oats, rye, and wheat. Low temperatures with killing frost on 14th to 18th and 27th and 28th. Cane grinding and potato digging in progress.—*J. B. Marbury.*

Idaho.—This was the driest and warmest November on record. Late fall plowing was retarded by dry weather. Winter wheat was slow in starting in localities, but was generally thrifty. Fruit trees were in excellent condition. Range grass was short in some localities. Stock was in fair to good condition.—*Edward L. Wells.*

Illinois.—A drought extending through October prevailed at the end of the month. The weather conditions were unfavorable for grasses and fall-sown wheat, but quite favorable for husking and garnering corn. Wheat maintained a good condition, but needed rain. Pastures were short in most sections and entirely bare in some. The greater portion of the corn crop had been husked and cribbed. Apples were keeping well in the northern counties, but much complaint of rotting was made elsewhere.—*Wm. G. Burns.*

Indiana.—The absolute range of temperature was 48°. Wheat suffered from freezing more than it would have had the ground been moist. November, 1904, was the driest on record in Indiana. The average precipitation was 0.36 inch, and the greatest amount at any station was 1.00 inch. Wheat and fall sown grasses in the central and southern sections suffered from drought. Good progress was made in cribbing corn.—*W. T. Blythe.*

Iowa.—The month was unusually warm and was the driest November on record. Ideal conditions prevailed for husking corn, which was mostly harvested without damage from heating. Pastures were excellent, and much fall plowing was done. Fall wheat and rye suffered some harm from drought. The total yield of crops was very satisfactory. The output of corn was about 60,000,000 bushels above the average of fifteen years.—*John R. Sage.*

Kansas.—Wheat generally was in good condition and most of it growing. The early sown wheat was all good, but the late sown was being injured in some counties by drought. Corn had generally been cribbed, except in the northwestern counties, where it was being gathered. Stock continued in good condition, but in the southern counties stock water became scarce.—*T. B. Jennings.*

Kentucky.—The drought that prevailed during October continued throughout November. It was general over the State, except in a few